

Cold Water

To the Medical Faculty of the
University of Pennsylvania.

Wm. H. McCalla

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Wm. D. McCall

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Gentlemen,

In conformity with the regulations of this Institution, requiring of each candidate for medical honours, a Dissertation deduced from the science of medicine; I have selected as the subject of a few remarks, the Medical effects produced by the external application of cold water in fever.

My practical knowledge of this remedy, as will be seen in the sequel, is very limited; on which account, perfection cannot, — will not be expected.

There is not a science which exhibits a more extensive field for useful research, or affords more ample entertainment to an inquisitive mind, than that of medicine; yet the improvements in it, since the revival of learning, have been, by no means, equal to those in other arts. Whilst the science of medicine has been kept upon the rack, by theories, as numerous as they are discordant; other sciences have progressed, in less obstructed paths, to a more perfect state.

The knowledge of the medical art, is very far from being completely established; — the field for observation is wide and extended, — the subject, inexhaustible.

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In taking a retrospect in the history of the cold bath, we find it was known to most of the nations of antiquity; the people of the East were ever accustomed to it, and the practice they have continued to the present time. The Greeks, long made use of no other bath than what was afforded them by seas and rivers. Public baths were discouraged, and even prohibited; they were contented at home with the use of artificial baths of very simple and rude construction. The Romans, who were chiefly employed in the culture of the grounds bathed the body partially every day; their habits of life, and dress rendered this practice necessary. It was long before artificial baths were known among them; the idea of these, they borrowed from the Greeks; at first they corresponded with the simplicity of the age, but in process of time, all the graces of architecture were lavished upon them, they became the emporium of all, the most fascinating luxuries, all that could give relaxation to the mind, or afford amusement to the people, were here collected. The system of bathing was finally carried to a height of luxury, and expense, which far exceeded that of the Greeks, or any of the Asiatic nations. In Africa the cold and warm baths constitute a very essential part of the system of living, and to

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a proper use of them, no doubt, they owe a great share of their longevity, their robust state of health, their predisposition to so few mental diseases, and their cheerful temper. In Germany, Turkey and some other nations of Europe and Asia; the bath was considered, not only a luxury, but a very important remedy in disease; and Mahomet it was so sensible of its utility, that he enforced the practice by an apostolic mandate. At what period it was first employed for medicinal purposes, I am unable to say, but it must have been an ancient remedy; as appears from Hippocrates, Galen and others, who employed it extensively for the cure of certain febrile affections; yet it does not appear that any laws were ever laid down, by which it could, with safety, be employed. Although it was freely employed, and with considerable success by Galen, for the reduction of the preternatural heat of fevers, and as late as the year seventeen hundred and thirty seven by De Hahn a German physician for the cure of a low epidemic fever which prevailed in Polesia; yet neither of these practitioners appears to have been guided in its application, by any methodic rules. From some cause or other after the time of De Hahn it fell into discredit. The honour of restoring the practice is due to Doct. Wright a British physician of consider-

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the eminence. In the year seventeen hundred and seventy seven, during the exacerbation of an ardent fever, he became by his own request the subject of this, then singular practice. The result exceeded his most sanguine expectations; the relief was immediate, and by its continued application his health was speedily restored. He afterwards found it successful in many other cases of fever, of which the world have an account. Since that time, numerous practitioners, in various parts of the globe, particularly in sultry climates, have pursued the same mode of treatment with nearly similar results. Although much at this period had been accomplished, yet much more remained to be done; the superstructure was yet to be raised upon the foundation so ably laid by Doct. Wright. This task devolved upon the late celebrated Doct. Currie of Liverpool. To him the world is chiefly indebted for the regulation of this bold practice, founded upon an ample field of experience. It is much to be regretted that in the United States a remedy so important, and so easy of attainment, should be so much neglected. The prejudices that have been raised against a method of treatment so bold and uncommon, have prevented it from making much progress. Its mode of operation has been misapprehended; the proper time for

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its administration has not been understood, and probably, from its having been misapplied on some occasions, it has been considered a dangerous remedy, and consequently seldom resorted to. New articles, which were formerly considered poisonous, are daily introduced into the Materia Medica, and experiments made with them, with little hesitation; yet when this remedy is proposed, although so simple, and the authorities for its use so ample; it is considered by many so extraordinary in its nature, as to be unworthy of even a fair trial.

The effects of cold water, when externally applied to the surface of the body, are well known. There is first a sensation of cold, giving the whole system a sudden shock; at this instant there are considerable debility and tremor, with a sensation of weight in the head; respiration is quick and laborious, but these effects are immediately succeeded by a very different series; there is a glow upon the surface, the head is relieved and every function appears to be carried on with increased vigour. These sensations are more rapidly produced, and of longer duration, in proportion to the vigour of the subject. If the water be continued any length of time, all the former appearances recur; Chills, cold extremities and at length the animal powers are exhausted. The increasing warmth which succeeds the application, constitutes what has been termed

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reaction, which depends upon the application being suddenly made, and to a large surface. The great conducting power of water, should be always in view. This is very obvious when the body is subjected to the bath, after the period of its reaction. So long as the body is under the influence of the cold bath, it is employed in the accumulation of heat; and the great effort of the constitution in effecting this, if continued too long, tends to the destruction of the vital powers.

Animal heat is the product of a kind of combustion which is going on in the lungs; by which, caloric is extricated, and uniting with the mass of blood, is distributed through the medium of the circulation, to every part of the body, thereby diffusing an equable warmth. Although there appear to be auxiliary agents in the production of animal temperature; yet its principle source is the lungs.

It has been proved by numerous experiments, that the temperature of the human body varies, but little under every variety of climate.

Although more may be generated under a torrid zone, yet nature, always provident, has constituted a counter agent, in the process of perspiration; by which, the superabundant mass of caloric is carried off, and its stimulus thereby prevented from destroying the living energy. The quantity of the perspirable discharge is

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not easily maintained, but it is the opinion of Physiologists of the present day, that nearly one half of all the fluids taken into the body, during the summer, passes off by the exhalents, either by sensible or insensible perspiration.

As a preventive of disease, but more especially of low contagious fevers; we have reason to believe, from the observations of many eminent authors, that the cold bath will be found to be effectual; than most of the means usually employed for that purpose. It was the opinion of Doct. Wright that if well timed, the cold affusion would not only cure all febrile exacerbations, but even prevent their taking place. An instance strikingly illustrative of its preventive power, is mentioned by Doct. Curie of Liverpool to have taken place in the year seventeen hundred and ninety two, in a regiment of troops, stationed in that place. There, he states, became affected with a low contagious fever, which, notwithstanding all the usual means had been adopted for arresting it, continued to spread rapidly among the men. Immersion in the sea was finally proposed, which being performed, had the desired effect: The progress of the fever was at once arrested; and

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here that were affected, derived from it the greatest advantage.
 In the fall of the year eighteen hundred and thirteen; a very alarming catarrhal epidemic made its appearance in
 various parts of the State of South Carolina. In the Town of
 Columbia, and the adjacent country, this fever, which for the
 most part assumed the dysphoid character, prevailed to a de-
 gree of fatality, before unknown. It sometimes ran its course
 in twenty four hours from its first attack. Children almost
 universally escaped; while adults, as well the athletic and
 vigorous, as those of weaker habits, were its victims. During
 this period, a company of about twenty gentlemen, of which
 number I was one, at stated intervals, used the cold bath.
 We all escaped without the slightest affection. An eruption
 so complete, did not fail to excite our astonishment, we all
 attributed it to the employment of the bath.

Its modus operandi is very intelligible. It increases the tone
 of the muscular fibre, strengthens the digestive ^{organs}, and by di-
 minishing the excitability of the whole system, renders the body
 less susceptible of external impressions from cold, moisture
 and sudden changes of temperature.

considerable quantities of water, or a reservoir united with the river, employing it, as they prefer, in irrigation and con-
servation of water, or in boat utility, or even when Augustan was nearly inaccessible, it is most usual for many in fever, and in other diseases. In the United States, being generally un-
der the influence of the sun, and in general, more numerous, have occasion to be most proper. In the hot form it is great a fever, it is nearly

Considerable caution is necessary in the external employment of cold water, as a remedy in disease. It is not only requisite to be acquainted with the time, proper for the application; but the mode of employing it ought to be known to the Practitioner; and unless a proper discrimination is made, with regard to the disease and constitution and condition of the patient, it may be of not the least utility; or even pernicious. It is said that the Roman Emperor Augustus was cured of a fever by the cold bath; but the same remedy unseasonably timed, proved fatal to Marcellus his heir. The most usual forms of applying cold water, as an external remedy in fever, are by affusion - immersion and by sponges or lavation. In the United States, it is most usually performed by sponging; being generally found more convenient, and patients more willingly submit to it, than to the other modes; but the affusion will, in general, be found more powerful, and its effects, I conceive, more permanent. In some states of disease, as I shall hereafter have occasion to notice, the lavation or sponging of the body will be most proper. Immersion has been occasionally resorted to, but from its great inconvenience, and probably not superior to affusion, it is rarely performed. According to the opinions of

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some Physiologists, the success of the cold affusion depends entirely upon the powerful, and general impression made upon the system. By others, it is contended that its beneficial effects are solely owing to the subtraction of inordinate heat from the surface.

To me it appears evident, that in those forms of fever, in which the heat of the animal does not transcend, or is even below the standard of health; the success of the remedy depends only upon the impression given to the general system, and not by any reduction of temperature; as it is often elevated by the application.

But in ordinary fever, characterized by an increase of heat upon the surface, the remedy can never be effectual unless preceded by a reduction of this accumulated heat. Although there are numerous cases of the former class, in which cold water may be beneficial - some of which I shall notice; but to the latter, I would in a great measure restrict its use. That it is bounding it, in too narrow limits, is not the fact, since one third or perhaps more, of the diseases, to which we are liable, are of this description, and to most of these, our remedy is specially applicable.

Exacerbations and remissions occur in most fevers; the former

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for the most part are well marked, being known by the flushing of the face and restlessness; or by thermometrical measurement; which test, gives an increase of temperature to the trunk of the body, of one or two degrees over the extremities; or above the average heat of the fever. A knowledge of this circumstance is highly important to the Practitioner. Our chief object in the external application of cold water in fever, being to reduce inordinate heat, the following rules and precautions may be proper.

First - The application is to be made during the hot stage of fever, when the heat is steadily above the natural standard, and equally diffused over the surface. Practitioners have generally preferred employing it, when the exacerbation was at its height; or as soon after as possible.

Sec^d. It is not to be employed during the cold stage of the paroxysm; and a caution is here necessary. The patient will sometimes complain of a sense of chillings, when the heat measured by a thermometer may be above the standard of health, and vice versa; may feel warm, when to those around him, he is absolutely cold -

Third^{ly}. While the patient is under profuse perspiration, or pre-

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ally, if it have continued some time, the application of cold will be unsafe. Sweating is always a cooling process. If he is covered with bed clothes, they should be removed, and he exposed for some minutes to the cool air, previous to the application of the water: as by these artificial means, the heat may be retained, which upon exposure, will rapidly pass off.

Truth: The application will be improper — ineffectual, or dangerous when congestion, or inflammation exists in any of the internal organs; except when the action is irregular and fluctuating when it will be safe, and effectual, especially when applied immediately to the part affected, — as in febrile delirium, applied to the scalp &c.

By a strict observance of these cautions, we may in the early stages of the greater number of fevers, boldly and confidently employ the affusion of cold water; but in the latter periods of disease, it must be made with great caution. It has been found to be salutary, in proportion as it is used more early, and such being the fact, we ought always to employ it as soon after the accession of the fever as possible. In the incipient state, it will generally arrest its progress; but if delayed till the advanced period, it will rarely be attended with

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into an effect; still however, it will moderate the symptoms, and materially contribute to a favourable termination. It has been found serviceable as late as the twelfth day; but at this advanced period of the disease, great caution must be taken, to keep the temperature of the application, within the bounds, in which it is grateful to the sensations of the patient. When considerable debility supervenes upon the fever, the water should be temperate, and applied with a sponge; — probably a solution of vinegar and water would, in this case, be preferable to water alone. In ordinary cases, when performed by lavation, water of the temperature of 40° , or 45° of Fahrenheit's thermometer, will in general, be sufficiently impressive; but if it be of the temperature of 85° , or 90° , it requires to be dosed with force, and in quantity, from a bucket or other large vessel, to insure its effect.

When we employ affusion, the subject may be placed in a large tub, or other convenient receptacle, and the water, with impetuosity, dosed over his head and shoulders; — or, allowed to descend gradually, in small quantity, according to the circumstances of the case, or the temperature of the water employed. In subjects vigorous, — in recent disease, and in warm climates; the former will be more proper; but in delicate, and exhausted subjects, — in the advanced stages of

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fever, and in cold climates; the latter mode, or springing the body
 will, in general, be sufficiently powerful. When the operation is per-
 formed, the patient should be wiped dry and laid in bed; except
 in vigorous habits, where the excess of heat had been great, and at
 an early period of the fever; when, this caution is not necessary.
 Common persimps, or spring water is most usually employed, and
 answers very well; but if sea water, or a saturated solution of common
 salt, can be afforded; they are to be preferred, on account of their stim-
 ulating effects upon the vessels of the skin. Effusion with salt water
 is more grateful to the patient, than fresh, and can be borne upon the
 surface, with safety, for a greater length of time.

A solution of vinegar and water, has been recommended for this
 purpose; but whether it is superior in efficacy to the brine, I am
 not prepared to say.

It is certain, correctly, the heat of the surface, before resorting to this
 application, is a matter, I conceive, of greater moment than is
 generally imagined. That the application of cold water to the surface
 of phlegmatic subjects, should be so often attended with ill success, ought
 not to excite our surprise, when we recollect how fluctuating is
 the heat of the animal frame; and how liable we are to be deceived

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when we judge solely by our sensations. I would, therefore, in all cases admitting the least doubt, recommend the use of a thermometer, which, with the sensations of the patient, will always enable the practitioner to employ with entire safety, this important remedy.

To ascertain the heat of the surface, by this means: the bulb of the instrument ought to be placed either in the axilla, or mouth of the patient, and secured, in the latter case, from the effects of respiration, by being covered with the tongue, and the lips closed.

Having, in a brief manner, laid down the most important precepts for regulating the employment of this remedy; it now only remains for me to notice cursorily, a few of the numerous diseases to which it is particularly applicable; and I may here state, generally, that almost all fevers, attended with a hot and dry skin, will be benefited by it; and in an especial manner, those of a typhus character.

I shall first proceed to the consideration of Intermittent fever; in which, the cold effusion has often been found very salutary; its effects are, however, less permanent than in the other forms of fever. If employed during the continuance of the hot stage, it will generally be followed by a solution of the fit; but unless other remedies are employed in the apexia, the fever will return

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at the usual period. It has been proposed to apply it, an hour or two previous, to the expected attack, and cases which have been thus treated for three or four days, have been effectually cured.

A case somewhat similar, came under my notice a few years ago. A boy, who had been afflicted with an Intermittent fever and ague for several months; was, by an accidental plunge into a mill pond a short time previous to the expected attack, completely cured. He had no return of the fever afterwards.

It has even been proposed to use the bath during the cold stage of an Intermittent, in order to hasten the reaction of the system; and we are assured, it has been thus successfully employed; but at this period, it is a remedy, so extremely unpleasant, that patients would rarely submit to it; and unless the subject were very vigorous indeed, the application would, I conceive, be attended with no little hazard.

In the Remittent forms of fever, which are confessedly of the same nature, as Intermittents; the external application of cold-water, will be equally salutary;

But to Continued fevers, where the heat is generally more uniform, and equally diffused over the surface; it appears to be still

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more appropriate. — Of all the diseases to which our remedy has been applied, in none has its employment been so extensive, and at the same time so successful, as in Typhus fever; and so great is my confidence in its efficacy in this disease; that I do believe, under favourable circumstances, it will produce effects, equal to any other remedy in the *Materia Medica*. It may be safely employed at any period of the fever, when there is not too great debility, but the earlier it is resorted to, the greater will be our prospects of a favourable issue. It has generally been recommended to employ it in the evening, when the temperature is somewhat increased; but if called earlier, it is not necessary to wait for this circumstance, but we may at once resort to it, provided the heat of the surface be (preliminarily) steadily above the standard of health. If one application be ineffectual in arresting its progress, or should it recur, the remedy is to be again and again employed. In general, three applications will be sufficient. When successfully applied, the heat will be abated, the pulse moderated, — the mind, if previously confused, will be calmed, and the patient, disposed to sleep.

After the fourth, or fifth day, the influence of the remedy is greatly diminished; but even then, it is attended with benefit, although

it does not, in general, arrest the course of the fever, yet its symptoms are greatly alleviated, and it contributes much to a successful termination. In the advanced stage, the washing of the surface with sponges, or cloths dipped in water, will be found perhaps, equally beneficial with the affusion, and more safe; especially if the subject be of delicate constitution.

I recollect a case of Typhus fever which occurred a few years ago, in which the application of cold water to the surface, although the disease had considerably advanced, was attended with admirable effects. The symptoms of this case were of the most violent and alarming nature;—the heat was great, and accompanied with high delirium,—all the usual means had been tried, but in vain;—the disease advanced,—and death appeared to be fast approaching to close the awful scene; at this momentous period cold water, rendered still colder by the addition of ice, was applied by means of sponges, to every part of his body. The effects surpassed almost, the hopes of the friends,—most of the febrile symptoms were relieved, and the patient was, very speedily, pronounced convalescent. In this instance the beneficial effects of cold lavation were very decided; and evinces the safety of its employment at any

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period of the fever, characterized by accumulated heat.

In the advanced stages of all fevers, of this type; vinegar, or a solution of vinegar and water, will be highly refreshing to the patient; but when great debility supervenes upon its employment, warm tea - warm wine & water - brandy & water, or some other powerful cordial, ought to be given immediately after the application is performed.

In the early stage of Yellow fever, the cold affusion is a very powerful auxiliary remedy. In the advanced stage, or when the disease has become completely established, it is of doubtful efficacy, and sometimes pernicious - If the action of the arterial system be not too great, we may immediately after the accession of the fever, resort to the bath; but if otherwise, it will be proper to premise evacuations, and then resort to affusion employing it very liberally. I cannot better recommend this remedy in the Yellow fever, than by an extract from a communication, from Doct. Thelden and Whitehead of Virginia, to Doct. Miller of N. York on this subject. They state, that after the affusion of cold water, in the Y. fever which appeared at Norfolk in 1801, the pulse was often reduced thirty strokes in a minute, - the burning heat of the skin was greatly lessened; and the thirst, head ache, and other uneasy sensations

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were greatly alleviated. They rarely found it necessary to continue the use of the cold affusion, longer than the fourth day; during which time, the bowels were kept open by the occasional exhibition of Calomel; and, that of all those patients to whom they had an opportunity of exhibiting this remedy on, or before the second day of the attack, they had the good fortune not to lose one; but after this period, it seemed to be attended with prejudicial effects. The merit of the cure in these cases, might have been attributed to the Calomel, had it not under the fairest trials, frequently failed. No disagreeable effects were produced by the combined use of the Calomel, with the affusion. This communication alone, would have been sufficient, to have established the importance of our remedy in this formidable disease; but we have abundance of authority, from other respectable sources, of its utility, which could be cited if necessary.

In some of the Exanthemata, it has been found not less beneficial. In the early stage of the eruptive period of the Small Pox, when the symptoms run high, the application of cold, of all the means employed, will prove most beneficial. The patient should be allowed cold drinks - should be exposed freely to the cool air, and his body ought to be washed

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with cold water; or if the fever be high, dashing cold water over the body every five or six hours, until the eruption is complete, has been recommended. A custom exists among some of the western tribes of Indians, of plunging into a stream of cold water, as soon as they perceive the eruption upon the surface; and we are assured that it is attended with the most happy results.

In the Plague, accident appears to have first shown the utility of the cold bath. During the invasion of Egypt by the French, so many cases of this disease, terminated successfully by a plunge into the Nile, besides numerous others, of a similar nature, in various parts of the world; that Practitioners were led to its employment in regular practice, and with the most decided advantage.

Although much contrariety of opinion, appears to have existed in the minds of many Practitioners, with regard to the propriety of employing cold affusion in Scarletina; it is now, I believe pretty generally admitted, that it is both a safe, and effectual remedy. The object here being chiefly to abate heat, it is to be employed only when the heat is preternaturally great, and continued until it is mitigated. As in other forms of fever, the earlier the application is made, the greater will be our prospects of success. I have known the most decided

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good effects result, from rubbing the body with cold water, by means of wet clothes; and doubt not, but affusing the surface, would, in many cases, be attended with more speedy, and permanent effects than the lavation.

In the *Influenza*, when the accompanying fever is of the Typhoid type the external application of cold water, has been succeeded by signal advantage. Doubts exist with many practitioners, with regard to the propriety of this remedy, in cases of disease connected with pulmonary symptoms. That cases of this nature, have been successfully treated by this remedy, is not I think, to be questioned. Doct. Combe of Liverpool, whose veracity is to be relied on; states, that being himself attacked by *Influenza*, he employed although of a Plethoric habit, with entire safety, and with decidedly good effects, this remedy. Other similar cases are recorded of its safety. I know a similar instance, in the case of a medical gentleman of South Carolina, who was attacked with this disease (which then raged as an epidemic) at the time that, he was suffering under a Pulmonary affection. The symptoms were very violent. The respiration was performed with difficulty, and the oppression at the breast was so great at certain periods, as to threaten him with instant dissolution. Notwithstanding those alarming, and apparently unfavourable symptoms, he

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cheatedly called for wet clothes to be applied to different parts of the body, particularly about the precordia. By this means, those paroxysms of oppression &c. were uniformly relieved. Notwithstanding the safety, and benefit that followed the local use of the remedy in these cases - I look upon it, as of very doubtful efficacy, and liable in many cases to be attended with very pernicious effects, when the two diseases are so blended together.

In the early stage of the disease, when it is characterized by considerable heat, and unaccompanied by symptoms of congestion in any of the great viscera, particularly of the lungs; I think the cold application may be resorted to, with the greatest prospect of success.

Having already extended this Essay much beyond my original intention; I shall close it, by merely observing, that besides those forms of fever, of which I have taken so general a view; the external application of cold water will be found exceedingly serviceable in a variety of other diseases; as Phrenitis, - Peripneumonia, - some cases of Mania, - Paralysis &c. &c; but of which, time will not permit me, at this time, to notice.